

# **CUNY High-performance Computing Initiative**

Paul Muzio

Nikolaos Trikoupis

- The CUNY HPC Center acknowledges support for the following:
- “Andy”, a SGI cluster with NVIDIA GPUs, was funded by:
  - NSF Grant 0855217
  - A grant from the NYC Council through the efforts of Councilman James Oddo
- “Salk”, a Cray XE6, was funded by:
  - NSF Grant 0958379
- MRI for Data Storage, was funded by:
  - NSF Grant 1126113
- New York State Regional Economic Development Grant

- Support CUNY's "Decade of Science" Initiative and the Integrated University Concept of Operation.
- Support the University's research and educational activities by making state-of-the-art HPC resources and expert technical assistance available to faculty and students.
- With CUNY faculty and researchers, develop proposals for external funding.
- Support National, New York State, and New York City initiatives in economic development.
- Support National and New York State initiatives to promote the sharing of HPC resources and technical knowledge.
- Support educational outreach programs designed to encourage intermediary and high school students to pursue higher education and careers in science and technology.

- Senior Colleges
  - City College
  - Hunter College
  - Baruch College
  - Brooklyn College
  - Queens College
  - New York City College of Technology
  - College of Staten Island
  - John Jay College of Criminal Justice
  - York College
  - Lehman College
  - Medgar Evers College
- Community Colleges
  - Bronx Community College
  - Queensborough Community College
  - Borough of Manhattan Community College
  - Kingsborough Community College
  - LaGuardia Community College
  - Hostos Community College
- Graduate and Professional Schools
  - CUNY Graduate Center
  - Sophie Davis School of Biomedical Education
  - School of Law
  - William E. Macaulay Honors College
  - Graduate School of Journalism
  - School of Professional Studies
- Largest urban university in the United States.
  - 260,000 students in degree credit programs
  - 250,000 adult, continuing and professional education students.
  - College Now
  - Academic enrichment program for 32,500 high school students offered at CUNY campuses and more than 300 high schools.
  - University Teacher Academy
  - Free tuition for highly motivated mathematics and science majors who commit to teach in NYC
  - Extensive STEM and LSAMP Programs
- Demographics:
  - 61% female, 39% male
  - 0.2% American Indian/Native Alaskan, 15.8% Asian/Pacific Islander, 27.1% Afro-American, 25.7% Hispanic, 31.2% White
  - 68% attended New York City public high schools
  - 42% first time college
  - A total of 195 different languages are spoken
- Alumni
  - 12 Nobel Laureates
  - 2 Field Medal Awardees
  - Numerous recipients of Pulitzer Awards
  - 4 Rhodes scholars in last 6 years
  - Andy Grove, Robert Kahn, Jonas Salk

# Geographical Dispersion





# WHERE ARE WE?

- College of Staten Island
- 4500 square feet (computer room and offices)
- UPS and diesel backup









1. “Andy” was funded under NSF Grant 0855217 and the NYC Council (James Oddo)
2. “Salk” was funded under NSF Grant 0958379



# Existing Systems (Jan 2012)

System	Cores	Chip	Memory/ core (GB)	Disk (Tbyte)	Interconnect
Athena	344	Woodcrest	2	3.2	Ethernet
Zeus	64	Harpertown	2	7.8	Ethernet
	16		2		Ethernet
Bob	232	Barcelona	2	7.1	Infiniband
Andy	744	Nehalem	3	36.0 (Lustre)	Dual and Quad rail Infiniband
	96 x 448	GPU - FERMI	3		PClex Gen2
Salk	1,280	Magny-Cours	2	126.0 (Lustre)	Custom
Karle	24	Westmere	4 / 96	Lustre	SMP

Bob – Robert Kahn, co-developer TCP/IP

Andy – Andy Grove, co-founder, Intel

Salk – Jonas Salk, developer of the polio vaccine

Karle – Jerome Karle, mathematician, chemist, Nobel Laureate

- Linux
- PBSpro
- Lustre file system
- Cray compilers
- CUDA
- GNU compilers
- Intel compilers
- PGI compilers
- PGI Accelerator Programming Model
- OpenMPI
- Subversion
- AMD AMCL
- Atlas
- Cray LIBSCI
- FFTW
- GSL
- GMF
- IMSL
- Intel MKL
- Matlab
- Mathematica
- R
- SAS
- Sparsekit
- Stata

- Bamova (Bayesian Analysis of Molecular Variance)
- Bayescan
- Beast
- BEST
- BPP2
- GenomePOP2
- IMa2
- LAMARC
- Migrate
- MrBayes
- MSMS
- RAxML
- Structurama
- Structure



- Dalton
- DL-Poly
- Gaussian03
- Gaussian09
- Gromacs
- Hondo Plus
- HOOMD
- LAMMPS
- NAMD
- NWchem
- Octopus

- ADCIRC Coastal Circulation and Storm Surge Model
  - ARC\_solar\_radiation
  - Community Earth System Model (CESM)
  - Finite Volume Community Ocean Model (FVCOM)
  - Regional Ocean Modeling System (ROMS)
  - Weather Research Forecasting System (WRF)
  - WRF-chem
  - Model Evaluation Tools
    - PB2NC
    - ASCII2NC
    - PCP Combine tool
    - NCEP
    - NCAR
    - GRADS
    - Gen Poly Mask Tool
    - Grid Stat Tool
    - Mode
    - Wavelet Stat Tool
    - Stat Analysis
    - Mode Analysis
  - NetCDF, PnetCDF, HDF4, HDF5
- 
- Network Simulator 2
  - Phoenix
  - Transims

- NSF Grant awarded in August 2011
- Storage Area Network
- Remote tape silo for backup and archiving
  - Fiber optic connection
- System is in pre-procurement stage
- Evaluating iRODS installation to support research activities and promote data sharing
  - Hosting a meeting with RENCI on 7 February 2012



- To support the activities of the 7 major research programs (and others)
  - Ecology, Evolutionary Biology, and Behavior Subprogram at the CUNY Graduate Center
  - Environmental CrossRoads Initiative
  - NOAA Cooperative Remote Sensing Science and Technology Institute
  - CUNY Institute for Sustainable Cities
  - Center for Maritime Systems, Stevens Institute of Technology
  - Institute for Macromolecular Assemblies
  - Subotnick Financial Services Center – Baruch College

Thank you

Questions?